City of Kalamazoo's Technical Review Comments
on
"Draft 2014 Groundwater Data Evaluation Report: Allied Landfill - Operable Unit 1"
April 2015
Prepared by CH2MHILL for USEPA

(This attachment represents the City of Kalamazoo's technical review comments to the above report. The comments follow the nine conclusions (Section 5), and are presented in numerical order as the bullet items appear within the draft report. The City's comments are in ***bold italic*** typeface.)

SECTION 5.0 CONCLUSIONS

1. "PCBs were detected in 2014 in one groundwater sample (MW-8A). The well screen at MW-8A is located immediately below waste material. The detected concentration was below both the GSI and drinking water protection criteria. This supports the previous ~~findings~~ that PCBs are not migrating offsite in groundwater."

   - ***A single occurrence of PCBs in one sample does not necessarily represent a current, significant impact to groundwater quality and is probably related to the occurrence of overlying paper-residuals at the location of this shallow well.***
   - ***However, the final draft should provide a more robust explanation supporting the conclusion that, ". . . PCBs are not migrating offsite in groundwater."***
   - ***Without that explanation and considering the specific sampling precautions to minimize potential sampling integrity issues (selective well locations, low-flow sampling techniques, turbidity, and related quality assurance measures), we cannot dismiss the evidence that dissolved PCBs at this location possibly reflect conditions wherever paper residuals occur above the water table elsewhere on the site not currently monitored.***
   - ***Given the above, the confirmed upward flow of shallow groundwater suggests contaminants could potentially discharge to Portage Creek; surface water sampling as part of a long term monitoring plan would identify such occurrences.***
   - ***It is understood that groundwater (and surface water) data generated from EPA's proposed long-term monitoring program (LTM) combined with their 5-year reviews, will measure the effectiveness of the selected remedial action, addressing performance issues and required improvements to correct problems identified.***

2. "The percentage of inorganics detected at concentrations exceeding SLs and/or background is comparable between the RI data set and the 2014 data."

   - ***We do not disagree with these observations.***
   - ***However, we are concerned that the selective use of regional and background groundwater values, especially for arsenic and lead, do not fully consider source and primary toxicological impacts of the observed exceedances.***
   - ***We believe development of the LTM program should include general water quality parameters (e.g. chloride, alkalinity, bicarbonate, sulfate along with major anions and cations) to allow intra-well and inter-well comparisons using meaningful geochemical analytical tools (e.g., Stiff & Piper, and trilinear diagrams) and over time to help***

differentiate and confirm sources of future exceedances; OU1, other contaminated sites, and/or natural variations.

- ***Historically, MDEQ's Wellhead Protection Program (WHPP) staff, who are charged with source water protection, have expressed concerns regarding the nature and occurrence contamination, particularly metals, at OU1 and possible long-term impacts to COK's well fields.***

3. "Based on the 2014 groundwater investigation data, there are no VOC groundwater exceedances attributed to OU-1. The one PCE exceedance is believed to be related to the Strebor property, since it was detected in the former Strebor well MW-40 and was historically detected at the same well by Strebor. The lack of VOC exceedances from OU1 is consistent with the determination of contaminants of concern in the FS."

   - ***This conclusion is misstated, an accidental replacement of the VOC exceedance (tetracholorethene) at MW-8 adjacent to the Panelyte property and the SVOC exceedance (pentachlorophenol) at MW-40i.***
   - ***CH2M-Hill has acknowledged this error and will correct it as when this draft report is finalized.***
   - ***Overall, COK does not disagree with the lack of VOC exceedances consistent with previous studies to the areas and depths investigated to-date.***

4. "Based on the 2014 groundwater investigation data, there are no SVOC groundwater exceedances attributed to OU1."

   a. "The one PCP exceedance is believed to be related to the Panelyte site due to the location in the Panelyte well MW-8. PCP was a contaminant of concern at Panelyte."

      - ***As stated above, the SVOC pentachlorophenol (PCP) was detected at Well MW-40i downgradient of the Strebor property, not at MW-8, which is adjacent to the Panelyte property.***
      - ***CH2M-Hill has acknowledged and will correct this error in the final version of this report.***
      - ***Based on the frequency of low-level concentrations of VOCs, we believe an intermediate well installed at the location of existing well nest MW-8/MW-8d is needed to fill an existing chemical and vertical gradient data gap present downgradient of the former HRDL/FRDL areas.***
      - ***We recommend that this well be installed as part of any OU-1 LTM program .***

   b. "The FS identified 4-methyl phenol as the only SVOC contaminant of concern for the site and was based on soil exceedances. There were no groundwater exceedances of 4-methylphenol in groundwater samples in either the RI or the 32 samples analyzed in 2014."

      - ***COK agrees with this conclusion based on the* limits of the areas and depths investigated to-date.**

5. "The general groundwater flow directions established for the CSM were confirmed as:"

   a. "Water table flow direction is toward Portage Creek"

      - ***We do not disagree that the* water table *flow direction is toward Portage Creek.***
      - ***However, we do not understand the basis for <u>excluding shallow wells</u> that do not straddle the water table to construct the water table elevation contour map, which if included, might improve the accuracy of the depicted water table surface and associated horizontal gradients.***
      - ***The report should provide some explanation as to why these wells were not used to update the Site's groundwater monitoring data.***

   b. "Intermediate and deep zone flow directions are toward the north-northeast."

      - ***We agree that the flow directions within the "intermediate" and "deep" water-bearing permeable zones located <u>above</u> elevation 630 feet amsl are towards the northeast and north, respectively.***
      - ***The city's well field historical modelling indicated the pumping stresses from the wellfields located north of OU1 govern the horizontal and vertical flow components in the regional aquifer <u>above</u> and <u>below</u> elevation 630 amsl.***

   c. "Vertical hydraulic groundwater gradients are predominately upwards ~~where measured~~ across the site and at neighboring properties, preventing downward groundwater flow to the deep aquifer."

      - ***From the data, <u>downward</u> vertical gradients exist at two of the six well pairs, (MW-7s/7i and MW-16i/MW-16d), suggesting a potential flow path to deeper, water bearing zones.***
      - ***Vertical gradients are likely subject to temporal fluctuations, possibly changing magnitude and direction, especially during periods of recharge.***
      - ***Again, from the data, the magnitude of the vertical gradient within the deeper screened zones is very slight, (particularly at MW-40i/MW-40d), which is only 0.0008 ft/ft compared to the 0.2 ft/ft gradient measured at the nest formed by MW-38/39 located across Alcott Street, less than 300 feet north.***
      - ***Similarly low-magnitude gradients between intermediate and deep well pairs also exist elsewhere on site.***
      - ***Therefore, comparison of vertical gradients between these two closely-spaced well pairs (MW-38/MW-39 and MW-40i/MW-40d) is not necessarily meaningful to the overall understanding of the deep, regional water-bearing zones, particularly considering the drawdown imposed by nearby COK well fields, especially during the summer peak demand season when a greater number of wells are used.***
      - ***To better understand the characteristics of the deep regional aquifer at OU-1 and the relationship to the COK wellfields north of OU1, we recommend that placement of wells screened within this deep water bearing formation will define the deep water bearing flow paths at OU-1.***
      - ***COK also acknowledges the flowing artesian condition present in the intermediate permeable zone at the MW-38/MW-39 nest, but notes this condition is not replicated elsewhere, suggesting unique, localized geologic conditions occur in the vicinity of this***

well not replicated elsewhere at OU1 or adjacent properties. We would like to review the available reports for Panelyte, Strebor and for the redevelopment that has taken place north of Alcott Street to help define the extent of the flowing artesian conditions and implications for the planned LTM program.

- ***COK requests the LTM consider the impacts to the current conceptual site model (CSM) associated with on-site waste consolidation and the proposed removal of the Alcott Street Dam, both which will impact the existing hydrogeologic regime, possibly the altering groundwater flow patterns and the magnitude and direction of current vertical gradients between water-bearing units.***

6. "Deeper soil type information (to an approximate elevation of 630 feet amsl) confirms the following CSM characteristics for unconsolidated soil deposits:"

   - "Alternating layers of permeable and less-permeable materials are present throughout each boring."
   - "Soil layer types are not continuous in thickness or occurrence between each boring location."
   - "A continuous clay or silt aquitard or aquiclude does not appear to be present beneath the site."

   - ***We agree with these three observations regarding the site geologic stratigraphy, which are typical of glacial deposits is southwest Michigan confirmed by extensive drilling data from city wellfields 1, 3 and 7***
   - ***This area lacks a natural soil barrier above the production zones in this area.***
   - ***To restate, the basis for city's long-term concerns with respect to well field vulnerability:***
     - ***lack of a continuous aquitard or aquiclude beneath the significant waste mass at OU-1 observed northern flow directions in the intermediate and deeper zones;***
     - ***lack of conclusive, consistent upward gradients within the boundaries of OU-1; and***
     - ***influence of continuous, ongoing pumping stresses from city well fields.***
   - ***How could this be mitigated?***
     - ***A representative groundwater monitoring program that also includes wells screened in the deeper regional water bearing formation.***
     - ***Consider existing data from adjacent properties to fully understand the overall flow regime to select meaningful monitoring locations and screened intervals.***

7. "Silt and clay layers, where present, have a low permeability that impedes groundwater flow, as evidenced by geotechnical laboratory analysis (5.7×10^{-7} to 8.1×10^{-8} centimeters per second)."

   - ***We acknowledge low permeability silt and clay layers impede groundwater flow where present in the subsurface.***
   - ***The confirmation of hydraulic conductivity of the representative samples collected as part of the 2014 investigation are helpful to understand the physical characteristics in the areas and locations investigated.***

8. "While a continuous aquitard or aquiclude is not present between shallow and deep aquifers at OU1, a complete migration pathway from OU1 to the City Well Fields does not appear to exist based on the consistent upward gradients from the deep aquifer."

   - ***Our response to this item is captured in items 5 & 6, above.***
   - ***As recommended above and discussed during our recent conference call, we believe deep monitoring wells set in the regional aquifer on OU-1 as part of the OU-1 LTM will certainly help improve the overall understanding of the regional aquifer and associated concerns relating to COK's municipal water supply.***

9. "The results from the 2014 investigation represents the current groundwater conditions. A LTM network should be developed with State and local agencies for continued monitoring if EPA selects a remedy that includes a waste in-place component."

   - ***It is understood that pursuant to CERCLA any remedy that allows waste to remain onsite will require a groundwater monitoring system used to provide long term evaluation of the selected remedy.***
   - ***Building upon the working relationships developed as the feasibility of redevelopment of parts of OU-1 have been considered, we support and look forward to partnering with MDEQ and USEPA to develop and implement a LTM program.***

'REGIONAL' GROUNDWATER ISSUES:

- ***Over the period of time that the city has had the opportunity to provide its input to EPA and MDEQ with respect to the OU-1 CERCLA action, particularly pertaining to the groundwater issues, it's understood that the city's position and its perspective has been driven by the fact that OU-1, in addition to other contaminated sites adjacent to OU-1, lie within a wellhead protection zone for a number of the city's production wells. We have previously conveyed to you our opinion, as stewards of the drinking water system, the significance of; MDEQ's support for; and the scientific basis for development of those wellhead protection zones.***
- ***The city's overarching goal is to provide safe and dependable drinking water to its users, which is accomplished, in part, by protecting the drinking water sources from contamination, irrespective of the source or government agency authority and responsibility.***
- ***It is also understood that the EPA Superfund Group's and MDEQ Remediation and Redevelopment Division's (RRD) primary goal at OU1 is to identify the extent of contamination and mitigate associated sources and that their responsibilities do not specifically include source water protection, the realm of the WHPP staff.***
- ***Furthermore, given MDEQ's apparent willingness to expand our discussions to look at other remedial sites within that specific wellhead protection zone, in addition to OU-1, such as Strebor, and Panelyte, that might impact groundwater quality of the deeper regional water bearing formation.***
- ***We believe the development of the LTM program should not rely on singular observations, but consider existing data from adjacent properties to fully understand the overall flow regime to select meaningful monitoring locations and screened intervals.***
- ***We suggest these focused discussions also include local and state source water protection staff.***

Connect the dots.

Based on existing info.